



A Demographic Information of Extra-Cardiac Findings in Cardiovascular Medicine

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Abstract

The cardiovascular complications of acute coronavirus disease 2019 (COVID-19) are well described, but the post-acute cardiovascular manifestations of COVID-19 have not yet been comprehensively characterized. Here we used national healthcare databases from the US Department of Veterans Affairs to build a cohort of 153,760 individuals with COVID-19, as well as two sets of control cohorts with 5,637,647 (contemporary controls) and 5,859,411 (historical controls) individuals, to estimate risks and 1-year burdens of a set of pre-specified incident cardiovascular outcomes.

Keywords: Cardiovascular magnetic resonance; cardiac MRI; incidental findings

Introduction

Since the very first cardiac images were created, cardiologists have struggled with what to do about “incidental” abnormalities in structures outside the heart. Echocardiographers were among the first to deal with this dilemma in the 1980s once subcostal views became part of a routine examination, because hypoechoic or hyperechoic structures in the liver, gall stones, and calcifications in the abdominal aorta are commonly visualized.

Similar issues confront the nuclear cardiologist. Because there is limited guidance on how to handle these findings, each interpreter likely approaches them in a different manner. Whereas some may ignore them, most probably comment along the lines of “abnormality noted, further testing suggested if clinically indicated” and feel that this satisfies their professional and moral obligations to the patient. This approach recognizes a possibly important finding while remaining cognizant of the inadequacy of cardiac images for visualizing and diagnosing noncardiac findings, the interpreter's own possible lack of specific training in recognizing noncardiac imaging pathology, and a vague legal liability for missing “something important.”

If we accept that the detection and management of extracardiac findings are important and likely to increase in prevalence as cardiac CT use increases in emergency departments and inpatient populations, then a key question is the level of experience and education that qualifies a cardiac imager to interpret extracardiac findings in CCT scans. Normally, the process of image interpretation is 3-fold: lesion detection, lesion characterization, and management recommendation. In the COCATS 3 document, training for the “recognition” of extracardiac findings is endorsed and once detected “require[s] referral to a specialist or radiologist with expertise in chest imaging.” This recommended workflow suggests that for a “cardiovascular medicine specialist” performing CCT, the standard 3-fold image interpretation process be distributed between 2 practitioners. Although a discussion of the operational challenges of such a workflow is beyond the scope of the present brief communication, there are pertinent training implications. Given that the majority of incidental extracardiac findings are clinically insignificant, a basic understanding of the characteristics of truly insignificant findings should augment the training on lesion detection. The latter task notably includes the detection of pathological processes as well as their exclusion through an in-depth understanding of normal anatomy, variant anatomy, and imaging artifacts.

Methods

CMR examinations were all interpreted by both a radiologist and cardiologist experienced in cMRI. The diagnosis of IEF was made upon images and always included in the report. All incidental findings discovered on cMRI were characterized by means of additional imaging techniques: ultrasound (US), computed tomography (CT), dedicated MR examination, bone scintigraphy with technetium 99m-methylene diphosphonate (99mTC-MDP), and positron emission tomography-computed tomography (PET-CT). IEFs were classified into three categories: (1) findings with mild or no clinical significance, (2) findings with possible clinical significance, and (3) clinically significant findings. The overall prevalence and the sites of extracardiac findings were evaluated and reported. CMR protocols were based on standardized protocols recommended by the Society for Cardiovascular Magnetic Resonance (SCMR) and the European Society of Cardiology (ESC) Working Group EuroCMR, respectively.

Statistical Analysis

The median age of the subjects was 51 years (range: 5–85 years). Incidental findings were found in 109/742 (14.7%) of examined patients for a total of 131 IEFs; of these, 52 (40%) were intrathoracic and the remaining 79 (60%) were located in upper abdomen. 15 out of 131 incidental findings (11%) were confirmed to be clinically significant, while in the remaining 116 findings 87 were considered to be of mild or no clinical significance (66%); 29 were considered to be of possible clinical significance (22%) based on patient's clinical condition.

Conclusion

The purpose of this study was to determine the prevalence of incidental findings seen at screening CMR studies. In total, 81% of our volunteers had extra-cardiac findings, of which 17% were potentially clinically significant, necessitating further work up. With incidental findings were best visualized on localizer sequences. Despite the fact that the majority of our findings were benign and that current practice regarding the reporting of incidental findings varies among institutions our study confirms that it is important to look beyond the heart when reviewing CMR studies and carefully assess the entire field of view for abnormalities.



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